

WHAT IS CLAIMED IS:

- 1           1.     A method for executing a workflow, comprising:
  - 2           providing a workflow class implementing methods and objects to provide
  - 3     information on and control of workflows;
  - 4           providing a work list class implementing methods and objects to provide
  - 5     information on and manipulate work items assigned to the workflows; and
  - 6           providing a work item class implementing methods and objects to provide
  - 7     information on and manipulate work items when executing one workflow.
  
- 1           2.     The method of claim 1, further comprising:
  - 2           calling methods in the workflow class to begin and terminate an instance of one
  - 3     workflow comprising nodes;
  - 4           calling methods in the work list class to obtain information on the work items and
  - 5     nodes in one workflow; and
  - 6           calling the methods in the work item class to enable a user to perform actions
  - 7     associated with one work item in one workflow, wherein at least one work item is
  - 8     associated with each node in the workflow.
  
- 1           3.     The method of claim 1, further comprising:
  - 2           calling one method in the work list class to determine nodes and associated work
  - 3     items in the workflow to process;
  - 4           calling one method in the work item class to lock the work item when providing a
  - 5     user access to workflow actions and documents associated with the work item; and
  - 6           calling one method in the work item class to unlock the work item after the user
  - 7     has completed all actions associated with the work item.

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1           7.       The method of claim 6, further comprising:  
2           calling methods in the work item class to make one container associated with one  
3           work item available to one user of one work item; and  
4           calling one method in the work item class to enable one user of one work item at a  
5           next node in the workflow access to the container.

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1           9.       The method of claim 8, further comprising:  
2           providing a workflow service class including methods and objects to provide  
3           information one workflows associated with one workflow service; and  
4           instantiating a workflow service object maintaining information on workflows and  
5           work lists for the workflows associated with one workflow service, wherein the methods  
6           of the workflow service obtain information on workflows and work lists from the  
7           workflow service object.

1           10.     The method of claim 9, wherein the workflow service object includes  
2     information on associated workflow templates, wherein each instance of an executing  
3     workflow is instantiated from one workflow template, further comprising:  
4           providing a workflow template class including methods and objects to provide  
5     information on one workflow template associated with one workflow service; and

6           instantiating a workflow template object maintaining information on one  
7   workflow template, wherein one or more workflow objects are associated with one  
8   workflow template object.

1           11.    The method of claim 10, wherein the workflow service object includes  
2   information on one or more associated workflow templates, and wherein one method of  
3   the workflow service class is called to obtain information on the one or more workflow  
4   templates associated with the workflow service.

1           12.    The method of claim 8, further comprising:  
2           providing a workflow notification class including methods and objects to provide  
3   information on notifications associated with one workflow that generate a notification if  
4   an action associated with one work item is not performed in a specified time period; and  
5           instantiating one workflow notification object maintaining information on one  
6   workflow notification, wherein one or more workflow notifications are associated with  
7   one workflow and wherein one work list includes one or more workflow notifications.

1           13.    The method of claim 8, further comprising:  
2           providing a container class including methods and objects to provide information  
3   on and control of containers used in workflows to transport data among the nodes,  
4   wherein the container object comprises an object that is used to transfer information  
5   among the nodes by enabling users to read and write data to the container; and  
6           instantiating one container object maintaining information on one container used  
7   in a workflow, wherein one container object is associated with one workflow object and  
8   one work item.

1           14.    The method of claim 1, wherein the classes comprise object oriented  
2   classes.

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1           15.     A system for executing a workflow, comprising:  
2                 means for providing a workflow class implementing methods and objects to  
3 provide information on and control of workflows;  
4                 means for providing a work list class implementing methods and objects to  
5 provide information on and manipulate work items assigned to the workflows; and  
6                 means for providing a work item class implementing methods and objects to  
7 provide information on and manipulate work items when executing one workflow.

1           16.     The system of claim 1, further comprising:  
2                 means for calling methods in the workflow class to begin and terminate an  
3 instance of one workflow comprising nodes;  
4                 means for calling methods in the work list class to obtain information on the work  
5 items and nodes in one workflow; and  
6                 means for calling the methods in the work item class to enable a user to perform  
7 actions associated with one work item in one workflow, wherein at least one work item is  
8 associated with each node in the workflow.

1           17.     The system of claim 1, further comprising:  
2                 means for calling one method in the work list class to determine nodes and  
3 associated work items in the workflow to process;  
4                 means for calling one method in the work item class to lock the work item when  
5 providing a user access to workflow actions and documents associated with the work  
6 item; and  
7                 means for calling one method in the work item class to unlock the work item after  
8 the user has completed all actions associated with the work item.

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1           18.    The system of claim 1, further comprising:  
2           means for providing a workflow notification class including methods and objects  
3 to provide information on notifications associated with the workflows, wherein one  
4 notification is generated if an action associated with one work item is not performed in a  
5 specified time period; and  
6           means for calling methods in the workflow notification class to obtain information  
7 on one notification and control a state of the notification.

1           19.    The system of claim 1, further comprising:  
2           means for providing a workflow service class including methods and objects to  
3 provide information on workflows associated with one workflow service; and  
4           means for calling one method in the workflow service class to obtain a list of all  
5 workflows associated with one workflow service.

1           20.    The system of claim 1, further comprising:  
2           means for providing a container class including methods and objects to provide  
3 information and control containers provided for workflows, wherein the container  
4 comprises an object that is used to transfer information among the nodes by enabling  
5 users to read and write data to the container; and  
6           means for calling the methods in the container class to read and write data to the  
7 container for at least one user of one work item.

1           21.    The system of claim 20, further comprising:  
2           means for calling methods in the work item class to make one container  
3 associated with one work item available to one user of one work item; and  
4           means for calling one method in the work item class to enable one user of one  
5 work item at a next node in the workflow access to the container.

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1           22.    The system of claim 1, further comprising:  
2                means for instantiating a workflow object maintaining information on one  
3    workflow, wherein the methods of the workflow class obtain information and control the  
4    workflow through the variables in the workflow object representing the workflow;  
5                means for instantiating a work list object maintaining information on work items  
6    and nodes in one workflow, wherein the methods of the work list class obtain information  
7    on work items and nodes in one workflow; and  
8                means for instantiating one work item object for each work item in one workflow,  
9    wherein the methods of the work item class obtain information on work items from the  
10   work item objects, wherein one work list object identifies one or more work items  
11   represented by work item objects and wherein one workflow object is associated with one  
12   or more work items.

1           23.    The system of claim 22, further comprising:  
2                means for providing a workflow service class including methods and objects to  
3    provide information one workflows associated with one workflow service; and  
4                means for instantiating a workflow service object maintaining information on  
5    workflows and work lists for the workflows associated with one workflow service,  
6    wherein the methods of the workflow service obtain information on workflows and work  
7    lists from the workflow service object.

1           24.    The system of claim 23, wherein the workflow service object includes  
2    information on associated workflow templates, wherein each instance of an executing  
3    workflow is instantiated from one workflow template, further comprising:  
4                means for providing a workflow template class including methods and objects to  
5    provide information on one workflow template associated with one workflow service;

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6 means for instantiating a workflow template object maintaining information on  
7 one workflow template, wherein one or more workflow objects are associated with one  
8 workflow template object.

1 25. The system of claim 24, wherein the workflow service object includes  
2 information on one or more associated workflow templates, and wherein one method of  
3 the workflow service class is called to obtain information on the one or more workflow  
4 templates associated with the workflow service.

1 26. The system of claim 22, further comprising:  
2 means for providing a workflow notification class including methods and objects  
3 to provide information on notifications associated with one workflow that generate a  
4 notification if an action associated with one work item is not performed in a specified  
5 time period; and  
6 means for instantiating one workflow notification object maintaining information  
7 on one workflow notification, wherein one or more workflow notifications are associated  
8 with one workflow and wherein one work list includes one or more workflow  
9 notifications.

1 27. The system of claim 22, further comprising:  
2 means for providing a container class including methods and objects to provide  
3 information on and control of containers used in workflows to transport data among the  
4 nodes, wherein the container object comprises an object that is used to transfer  
5 information among the nodes by enabling users to read and write data to the container;  
6 and  
7 means for instantiating one container object maintaining information on one  
8 container used in a workflow, wherein one container object is associated with one  
9 workflow object and one work item.

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1           28.    The system of claim 1, wherein the classes comprise object oriented  
2 classes.

1           29.    An article of manufacture for executing a workflow by:  
2           providing a workflow class implementing methods and objects to provide  
3 information on and control of workflows;  
4           providing a work list class implementing methods and objects to provide  
5 information on and manipulate work items assigned to the workflows; and  
6           providing a work item class implementing methods and objects to provide  
7 information on and manipulate work items when executing one workflow.

1           30.    The article of manufacture of claim 29, further comprising:  
2           calling methods in the workflow class to begin and terminate an instance of one  
3 workflow comprising nodes;  
4           calling methods in the work list class to obtain information on the work items and  
5 nodes in one workflow; and  
6           calling the methods in the work item class to enable a user to perform actions  
7 associated with one work item in one workflow, wherein at least one work item is  
8 associated with each node in the workflow.

1           31.    The article of manufacture of claim 29, further comprising:  
2           calling one method in the work list class to determine nodes and associated work  
3 items in the workflow to process;  
4           calling one method in the work item class to lock the work item when providing a  
5 user access to workflow actions and documents associated with the work item; and  
6           calling one method in the work item class to unlock the work item after the user  
7 has completed all actions associated with the work item.

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Parameter	Control		Fertilizer		Fertilizer + PGR		Fertilizer + PGR + GA	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Plant height (cm)	100.0	1.5	100.0	1.5	100.0	1.5	100.0	1.5
Stem diameter (mm)	10.0	0.5	10.0	0.5	10.0	0.5	10.0	0.5
Root length (cm)	15.0	1.0	15.0	1.0	15.0	1.0	15.0	1.0
Root diameter (mm)	5.0	0.5	5.0	0.5	5.0	0.5	5.0	0.5
Shoot weight (g)	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0
Root weight (g)	5.0	0.5	5.0	0.5	5.0	0.5	5.0	0.5
Shoot:root ratio	2.0	0.2	2.0	0.2	2.0	0.2	2.0	0.2
Chlorophyll content (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein content (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Carbohydrate content (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Stomatal conductance (mmol/m <sup>2</sup> /s)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Transpiration rate (mmol/m <sup>2</sup> /s)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Water use efficiency (g/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Relative water content (%)	100.0	1.0	100.0	1.0	100.0	1.0	100.0	1.0
Chlorophyll fluorescence (Fv/Fm)	0.8	0.05	0.8	0.05	0.8	0.05	0.8	0.05
Protein synthesis (mg/g/h)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein degradation (mg/g/h)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein turnover (mg/g/h)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein stability (h)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein solubility (%)	100.0	1.0	100.0	1.0	100.0	1.0	100.0	1.0
Protein concentration (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein quality (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein yield (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein efficiency (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein productivity (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein sustainability (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein resilience (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein robustness (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein adaptability (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein flexibility (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein variability (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein diversity (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein richness (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein evenness (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein dominance (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein rarity (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein commonness (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein uncommonness (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein uniqueness (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein distinctness (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein similarity (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein dissimilarity (mg/g)	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
Protein heterogeneity (mg/g)	1.0	0.1	1.0	0.1	1.0			

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2
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1           36.     The article of manufacture of claim 29, further comprising:  
2           instantiating a workflow object maintaining information on one workflow,  
3     wherein the methods of the workflow class obtain information and control the workflow  
4     through the variables in the workflow object representing the workflow;  
5           instantiating a work list object maintaining information on work items and nodes  
6     in one workflow, wherein the methods of the work list class obtain information on work  
7     items and nodes in one workflow; and  
8           instantiating one work item object for each work item in one workflow, wherein  
9     the methods of the work item class obtain information on work items from the work item  
10    objects, wherein one work list object identifies one or more work items represented by  
11    work item objects and wherein one workflow object is associated with one or more work  
12    items.

1           37.     The article of manufacture of claim 36, further comprising:  
2           providing a workflow service class including methods and objects to provide  
3     information one workflows associated with one workflow service; and  
4           instantiating a workflow service object maintaining information on workflows and  
5     work lists for the workflows associated with one workflow service, wherein the methods  
6     of the workflow service obtain information on workflows and work lists from the  
7     workflow service object.

1           38.     The article of manufacture of claim 37, wherein the workflow service  
2     object includes information on associated workflow templates, wherein each instance of  
3     an executing workflow is instantiated from one workflow template, further comprising:  
4           providing a workflow template class including methods and objects to provide  
5     information on one workflow template associated with one workflow service; and

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6           instantiating a workflow template object maintaining information on one  
7 workflow template, wherein one or more workflow objects are associated with one  
8 workflow template object.

1           39.     The article of manufacture of claim 38, wherein the workflow service  
2 object includes information on one or more associated workflow templates, and wherein  
3 one method of the workflow service class is called to obtain information on the one or  
4 more workflow templates associated with the workflow service.

1           40.     The article of manufacture of claim 36, further comprising:  
2           providing a workflow notification class including methods and objects to provide  
3 information on notifications associated with one workflow that generate a notification if  
4 an action associated with one work item is not performed in a specified time period; and  
5           instantiating one workflow notification object maintaining information on one  
6 workflow notification, wherein one or more workflow notifications are associated with  
7 one workflow and wherein one work list includes one or more workflow notifications.

1           41.     The article of manufacture of claim 36, further comprising:  
2           providing a container class including methods and objects to provide information  
3 on and control of containers used in workflows to transport data among the nodes,  
4 wherein the container object comprises an object that is used to transfer information  
5 among the nodes by enabling users to read and write data to the container; and  
6           instantiating one container object maintaining information on one container used  
7 in a workflow, wherein one container object is associated with one workflow object and  
8 one work item.

1           42.     The article of manufacture of claim 29, wherein the classes comprise  
2 object oriented classes.

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